Natural For DL1

This section covers the following topics:

- General Information
- Documenting IMS/DL1 Data Structures
- Creating Objects for IMS/DL1 with Incorporation Functions
- Maintaining Documentation for IMS/DL1
- Generation Functions for Files of Type I, J and K

General Information

Natural for DL1 allows use of data stored in IMS/DL1 databases with Natural applications. Natural for DL1 uses the following control blocks:

- Natural for DL1 database descriptions (NDB) containing the information about the segment structure of an IMS/DL1 database and about the key fields of the segments.
- Natural for DL1 program specification blocks (NSB) reflecting an external view of a database, as it is used by an application program.
- User-defined fields (UDF) establishing a field structure in a database segment.

For more details see the description of the Natural SYSDDM Utility in the Natural Utilities Menu.

Predict supports the use of Natural for DL1 in the following ways:

- IMS/DL1 databases can be documented.
- User-defined fields can be documented (as segment layouts).
- Userviews of segments can be defined.
- Natural DDMs for IMS/DL1 segments and their userviews can be generated.
- Copy code for segment layouts in third generation languages can be generated.
- User-defined fields for Natural for DL1 can be generated.

The documentation of NSBs (Natural for DL1 program specification blocks) is currently not supported by Predict.

Documenting IMS/DL1 Data Structures

IMS/DL1 data structures are documented with objects of the following types:

- Databases are documented with database objects of type I.
- Segments are documented with file objects of type I.
- Sequence fields, search fields and alternate index fields are documented with field objects in these files.
- Segment layouts are documented with file objects of type J.
- Userviews are documented with file objects of type K.

Databases

There are two types of IMS/DL1 databases: physical and logical.
The file list of a database object of type I consists only of files of type I.

Segments

Segments of an IMS/DL1 database are documented with file objects of type I. There are four types of IMS/DL1 segments:

- logical segments (only in logical databases);
- physical segments (only in physical databases);
- logical children (only in physical databases);
- virtual logical children (only in physical databases).

Each file of type I belonging to a physical database contains the sequence field, the search fields and the alternate index fields of the segment it documents. These fields are referred to below as "IMS/DL1 fields".

Each file of type I belonging to a logical database contains the IMS/DL1 fields of the segment of a physical database from which it is derived. A concatenated segment in a logical database contains the IMS/DL1 fields of both the logical child (virtual logical child) and the logical parent (physical parent of paired real logical child) from which it is derived.

Segment Layouts

User-defined layouts for an IMS/DL1 segment are documented with files of type J. Each file of type J has a master file of type I that documents the segment. Field definitions of a segment layout have the same structure as definitions of a sequential file: the position of a field cannot be specified directly but is determined by its offset. The offset is calculated from the lengths of the fields already defined. Therefore dummy fields must be defined if space is to be left free between two fields.

The IMS/DL1 fields of a file object of type I can be contained in the file of type J but they must have the same format, length and offset as in the file of type I.

Recommendations

Predict allows field IDs longer than 19 characters for files of type J; IDs of this length are not supported by SYSDDM. For this reason we recommend the following:

- Only use Predict to generate DDMs from files of this type. Do not use the utility SYSDDM. This can be enforced by setting the general default parameter Protection > SYSDDM utility to C or D.
- Only use the Predict Coordinator to transfer DL1 structures. If you use Natural utilities, field IDs longer than 19 characters will be truncated.

Userviews

Userviews of the segment are documented with file type K. Userviews have as master files the files of type I that document the segment. A userview (file type K) can contain the IMS/DL1 fields of the segment (type I) and fields of each layout (type J) of the segment.

Creating Objects for IMS/DL1 with Incorporation Functions

Databases and file objects of type I are created by incorporating Natural for DL1 NDBs using the Incorporate NDB function. These objects cannot be created manually using Predict maintenance functions Add Database/File. The following rules apply for incorporation of IMS/DL1 databases and segments:

- A Natural for DL1 NDB is generated by assembling an IMS/DL1 database description (DBD) with the Natural for DL1 macro library according to the Natural Utilities documentation. When this has been done, the NDB can be incorporated into Predict.
- Before a logical NDB is incorporated, the physical NDB or NDBs from which the logical NDB is derived should be incorporated so that the references to source segments can be established. Also, if a physical NDB

contains a virtual logical child and the paired real logical child is located in a different NDB, the NDB containing the real logical child should be incorporated first. If this is not possible, because there are either references back to the first NDB, or references to source segments inside the same NDB, the incorporation must be run twice to make sure that all source references are established.

- If user-defined fields for a segment have been defined in the SYSDDM DL1 services before the NDB is incorporated, the Incorporate NDB function incorporates the user-defined fields as well. In this case, at least one file of type J is created. If there are redefinitions in the user-defined fields, several layouts are created for the segment.

For details and options of the NDB incorporation function, see the section Incorporation in the **External Objects in Predict documentation**.

Maintaining Documentation for IMS/DL1

The segment structure of an IMS/DL1 database and the format, length, offset and type of the IMS/DL1 fields can be changed by carrying out the following three steps:

- rewrite the IMS/DL1 database description
- reassemble the IMS/DL1 database description with the Natural for DL1 macro library
- incorporate the resulting NDB into Predict using the Replace option.

  Note:
  These attributes cannot be changed with maintenance functions as described in the section Maintenance in the **Predict Reference documentation**.

When an NDB is replaced, existing segment layouts in Predict are not replaced. Hence, user-defined fields are only incorporated once, and should from then on be maintained only in Predict.

Only certain attributes of Predict field objects contained in files of type I can be changed, for example, Field ID, Natural edit mask and Abstract. Certain changes to field formats are allowed, as described in the section Field in the **Predefined Object Types in Predict documentation**.

Maintaining Documentation of IMS/DL1 Segment Layouts

Segment layouts (type J) can be modified without restrictions. Also, new layouts can be created and existing layouts can be deleted.

Maintaining Documentation of IMS/DL1 Userviews

A userview (file of type K) can be created by selecting fields of a segment (file of type I) and fields of layouts (files of type J) that belong to that segment. Attributes such as field ID, Natural edit mask and field comments can be changed in Predict objects belonging to files of type K.

Generation Functions for Files of Type I, J and K

Generating DDMs

DDMs can be generated for files of type I, J and K.

The generation of a DDM requires the existence of the corresponding Natural for DL1 user-defined fields (UDF). The required UDF is generated automatically whenever a DDM for a segment is generated (or regenerated if the segment layouts have been changed). A UDF can also be generated independently from the generation of a DDM. When generating the UDF, Predict automatically selects a valid database number (for example a database number which is defined in an IMS or DL1 macro) and a free file number. These numbers are later used for the DDM generation.

The position and length of fields in a UDF is determined from the layouts of the segment (file type J).

Each DDM contains the IMS/DL1 fields of the given segment and the higher level segments. Additionally the following definitions will be contained for the different file types:

- The DDM of a file of type I contains the fields of all layouts of that segment.
- The DDM of a file of type J contains the fields of that layout.
- the DDM of a file of type K contains the fields of that userview.

Generating Copy Code

Copy code for record buffers in third generation programming languages can be generated for a given layout (file of type J). Synchronized and align options are not allowed: for FORTRAN copy code, fields must already lie within the appropriate boundary.